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THE CASE FOR STRATEGIC ATTACK

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> But there is another way It is possible to increase the likelihood of success without defeating the enemy's forces. I refer to operations that have direct political repercussions, that are designed in the first place to disrupt the opposing alliance, or to paralyze it, that gain us new allies, favorably affect the political scene, etc. If such operations are possible it is obvious that they greatly improve our prospects and that they can form a much shorter route to the goal than the destruction of the opposing armies.[1]
>
> Carl von Clausewitz, On War

INTRODUCTION

Since its very inception, the concept of strategic aerial attack has been exceedingly contentious. Strategic attack--or strategic bombardment, as it was known in earlier days--was originally conceived by early air power theorists as an independent, war-winning means of destroying an enemy's will to fight. Later, more refined concepts advocated decisive aerial destruction of the enemy's industrial base, or capability to resist. Today, most contemporary theories emphasize the "paralyzation" or coercion of enemy leadership[2], while "strategic attack" is defined officially as:

> Air combat and supporting operations designed to effect, through the systemic application of force to a selected series of vital targets, the progressive destruction and disintegration of the enemy's war-making capacity to a point where the enemy no longer retains the ability or the will to wage war. (Joint Pub 1-02)[3]

Regardless of the particular theory, on the surface they all seemed to offer a relatively "quick and easy" means to victory. Unfortunately, at least until the Gulf War, performance generally failed to match promise. While air power played an "occasionally spectacular, increasingly important"[4] role in war, in no case did it provide the swift and certain victory promised. Applied strategically, air power appeared to be a far more blunt instrument than its advocates hoped, the will of target populations and the resilience of enemy industries much stronger than predicted. Early attempts

to use air power for decisive results--such as the Combined Bomber Offensive in World War II and the Rolling Thunder campaign in Vietnam--degenerated into attrition warfare merely elevated to a third dimension. As even the Air Force's basic doctrine manual admits, "The performance of strategic air power has rarely matched expectations for it. Thus its contribution toward military victory has always been debated."[5]

The stunning achievements of air power in the Gulf War, however, seemed to finally lay to rest the long-running issue of the efficacy of strategic attack. Air power advocates trumpeted the mature decisiveness of the aerial weapon and loudly proclaimed a "revolution in warfare", a claim supported by many of the early post-war studies.[6] Nevertheless, in the last few years the debate has exploded once again, reaching a level of internecine intensity almost unprecedented since air power's infancy The Army's official history of the Gulf War, Certain Victory, played down the impact of air operations in general, and of the strategic campaign in particular.[7] Numerous articles in various professional military journals characterize strategic attack as "a fundamentally flawed and historically discredited doctrine."[8] Even several thoughtful postwar analyses, including the Air Force's own authoritative Gulf War Air Power Survey, appear to cast doubt on the overall effectiveness of the strategic campaign, emphasizing instead the impact of air power on the Iraqi forces in Kuwait.[9]

In light of these arguments, what is the bottom line on strategic attack? Theory and abstract arguments aside, what can it no-kidding do for the overall theater campaign? Is it **the** decisive means of applying American military power? Or is it a wasteful, even counterproductive misapplication of a limited resource? This paper

argues that, on balance, a strategic air campaign is an important--in most cases necessary--component of a fully developed theater campaign. While it may not be the independent, war-winning panacea air power zealots claim, neither is it "outside the proper grammar of war"[10], as certain surface-bound luddites believe. The discussion below therefore examines both the utility and the limitations of conventional strategic attack, not in an attempt to propose a new theory of strategic aerial warfare but rather to explain, in plain terms, just what this tool **can** do, as well as what it likely **cannot.**

WHAT STRATEGIC ATTACK CAN DO...

Perhaps most obviously, strategic attack can now achieve results far more efficiently than in the past. The limitations of most previous air campaigns were fundamentally technological--it just took too many airplanes (and too much attrition) to achieve too few results. By Desert Storm, however, technology had caught up with a vengeance. Stealth has reinstated surprise and nullified defenses (at least for now, the bomber does always get through). Precision has precipitously lowered the number of sorties necessary to destroy a single target. And penetrating conventional weapons have made almost all targets--no matter how well defended or hardened--exceedingly vulnerable. In combination, these attributes today provide enormous leverage when applied as part of a coherent campaign. In the words of noted air power analyst Dr. Barry Watts, "Stealth and precision [in the Gulf War] yielded *an order of magnitude increase in the rate* at which target *systems* could be attacked (targets per sortie) as compared with Southeast Asia (sorties per target)[emphasis original]."[11] A recent RAND analysis, The New Calculus: Analyzing Airpower's Changing Role in Joint

Theater Campaigns, calculates that it would take only eight (Iraq) to twelve (North Korea) days for a nominal force to destroy the 250 time-critical aimpoints requiring precision attack in a future major regional contingency (MRC).[12] A strategic air effort is now simply much easier to do than in the past.

Furthermore, a strategic air campaign today also costs much less--in terms of sorties, bombs, losses, and collateral damage--than it used to. Total coalition strikes against the eight "core" strategic target sets comprised less than 15 percent of Gulf War "shooter" sorties.[13] Total bomb tonnage (throughout the entire theater) was less than two percent of that dropped on Southeast Asia, including only 15,976 precision guided munitions (PGMs).[14] Additionally, stealth, advances in defense suppression and electronic warfare, and liberal use of unmanned cruise missiles kept loss rates unprecedentedly low. Only 38 aircraft were lost throughout the entire Gulf war, compared to the 617 fixed-wing aircraft downed over North Vietnam.[15] In the equally important category of enemy civilian deaths and collateral damage--to which Americans are particularly sensitive--costs were also orders of magnitude less than in past wars. The best available estimates of civilian casualties country-wide (from Greenpeace, no less!) add up to only 2,278 dead and 5,976 injured.[16] Another authoritative source estimates less than a thousand civilian deaths.[17] There were no Dresdens; there were no Osakas. A future strategic campaign won't be bloodless--we'll still lose airplanes and kill some people we don't want to. But it will cost much less than in the past.

In line with improvements in efficiency and cost, air efforts can also now unambiguously produce certain effects that were once enormously expensive and

difficult (if not impossible) to achieve. For most nodal targets, it's no longer a question of "whether", only "when". A strategic air campaign can now rapidly turn off the lights, shut off the pumps, and, at least to a degree, cut the comm wires--thus directly limiting an enemy's ability to wage war. During World War II, Nazi industrial minister Albert Speer, who well-understood the critical importance of electricity to war production and a functioning government, feared attacks on the German power system beyond all else.[18] Unfortunately, the Combined Bomber Offensive never seriously targeted electrical power, in part because of a perceived lack of capability to destroy it. Conversely, in the Gulf War the Iraqi national grid was shut down in days, and electrical power reduced by 88 percent in less than three weeks.[19] Likewise, critical petroleum, oil and lubricant (POL) production, the lifeblood of a modern military, was squeezed 93 percent by Day 34 of the war, which compares quite favorably with the tremendous efforts expended between 1943 to 1945 to put the German fuel industry out of business.[20] Even the Iraqi communications network, a modern, redundant system which proved a tough nut to crack, was eventually severely disrupted, if not completely severed.[21] The impact of these type effects would of course be delayed for weeks or even months, and will not alone bring victory. However, they certainly bound, in space and time, the enemy's capability to wage modern, mechanized war. Our adversaries cannot fight long if they don't have the wherewithal, and, in contrast to the past, we now have the tools to reliably take that capability away.[22]

On a less quantifiable basis, a strategic air campaign also has the potential, if properly executed (and given some luck), to "institutionalize" the initial results of a successful surprise attack. Victims of surprise attack (like the H-Hour attacks in

Desert Storm) exhibit, at least initially, a high degree of shock, paralysis, and disbelief--what military writer Liddell Hart called "dislocation".[23] Strategic attacks on leadership, headquarters, electricity, and command and control facilities can make these effects more or less permanent by taking out the systems the enemy needs (their "eyes" and "ears") to recover their equilibrium. The "Aspin Report"'s postwar finding that "the mass and precision of the air attack induced systemic shock and paralysis from which the [Iraqi] political and military leadership never recovered"[24] can certainly be disputed on the basis of the available empirical (vice anecdotal) evidence. On the other hand, there are strong indications that the strategic air campaign at the very least induced a great deal of friction into the enemy system.[25] This friction slows down the enemy's decision-making and puts us inside their "decision cycle". It may not reduce their will to continue fighting, but it will limit their ability to do so effectively.

The historical evidence also strongly points to another bonus result of strategic attack. War in general, and strategic attack in particular, are what mathematicians and physicists term "nonlinear processes". Clausewitz himself pointed out that "the very nature of interaction [with the enemy] is bound to make it unpredictable."[26] As a result, **unforeseen**, indeed **unforeseeable**, events **will** occur.[27] When these things are bad (for us), they're called friction (more on that later). When good things happen, they're known as "second-order effects". History shows us that second-order effects which significantly aid the theater campaign will always occur during the course of a strategic air effort. The Doolittle Raid in 1942 caused the Japanese to pull back considerable forces to defend the home islands against a virtually nonexistent threat. Unforeseen German reactions to the Combined Bomber Offensive were even more

pronounced. As Speer sorrowfully observed in Inside the Third Reich:

> Had it not been for this new front, the air front over Germany, our defensive strength against tanks would have about doubled.... Moreover, the antiaircraft force tied down hundreds of thousands of young soldiers. A third of the optical industry was busy producing gunsights for the flak batteries. About half the electronics industry was engaged in producing radar and communications networks for defense against bombing. Simply because of this...the supply of our frontline troops with modern equipment remained far behind that of the Western Armies.[28]

Additionally, according to the Strategic Bombing Survey, the German effort to build the V-1 and V-2 retaliatory weapons cost them the astounding equivalent of 24,000 fighter planes in the last year and a half of the war alone.[29] Even the short-lived Gulf War produced second-order effects when the Iraqis pulled the plug on their radars to avoid destruction, thus effectively blinding themselves, and later flew the cream of their Air Force to Iran to escape coalition bombing. In short, unexpected good things happen for our war effort as an indirect result of strategic bombing. The very process of adjusting to air attack always costs the enemy something; sometimes it costs them a great deal.

Initiating a strategic air campaign as part of a larger theater campaign is also the only practical way of preventing the enemy leadership and population from getting a "free ride" during the early stages of an MRC-type war.[30] William Tecumseh Sherman clearly had a good point when he said in 1861: "War is the remedy our enemies have chosen, and I say let us give them all they want." In some situations punishment may be a legitimate political objective. This is not to suggest resurrecting discredited and morally bankrupt ideas about targeting cities and civilians. Nor does it imply that our effort will necessarily break their will to resist or cause the government

to be overthrown. Rather, by "going downtown" on opening day we simply ensure the enemy leadership and population clearly understand that there is a war going on, that we will wage it with virtually everything we have, and that not just their conscript frontline soldiers will pay the price. Air attacks are also an effective complement to the economic sanctions and naval blockade which typically precede actual conflict--what some commentators have termed "sanctions with teeth". Additionally, if the enemy leadership is a strategic center of gravity in the war--and they almost always are--then why not attack them? As Bruce Ross points out in "The Case for Targeting Leadership in War": "When the United States goes to war, committing lives and treasure to a cause, the option to target the enemy's leadership should not be dismissed out of hand."[31] In most cases a strategic air campaign will be the only way to immediately strike at the enemy elite, as well as preclude a free ride for the people that started it all.

Along the same line, a strategic air campaign may also be the best, if not the only way to achieve many of our other military or even political objectives in an MRC. For example, according to the CINC's Operations Order for Desert Storm, there were six theater military objectives.[32] Four of these objectives--attack Iraqi political and military leadership and command and control, gain air superiority, sever Iraqi supply lines, and destroy nuclear, biological and chemical (NBC) capability--were realistically achievable only by strategically (and, to a certain extent operationally) applied coalition air. The fifth--destroy the Republican Guard--was assigned to both air and surface forces. Only the sixth objective of the Desert Storm campaign--liberate Kuwait City--was a traditional ground operation. On a higher plane, a key political objective of the

war was to reestablish the balance of power to ensure future stability for the Gulf region. Achievement of that objective, therefore, called for the strategic air campaign to destroy the Iraqi Air Force not only as an operational means to an end (air supremacy), but also as a strategic end in itself (so Saddam would no longer have an air force to threaten his neighbors with).

A final, compelling argument for strategic attack can be made on the basis of comparative advantage--we're very good at it, while nobody else even comes close. According to noted commentator Eliot Cohen in his recent Foreign Affairs article "The Mystique of U.S. Air Power", "No other nation on earth has comparable [air] power, nor will any country accumulate anything like it, or even the means to neutralize it, for at least a decade and probably much longer."[33] We can, in effect, open up another front on the enemy without fear of retaliation beyond terrorism or (at least for now) militarily ineffective Scud attacks.[34] To not use such asymmetric power--the equivalent of a powerful boxer with much longer reach than his opponent--to achieve strategic results forgoes a tremendous American advantage.

Strategic air attack is thus a vital tool in a theater campaign. Increases in efficiency, much reduced costs, and a newly-proven capability to achieve specific effects provides us the means to achieve many objectives, preclude a free ride for the enemy, and benefit from second-order effects. Its a tool we must use to maximum advantage.

...AND WHAT IT CAN'T.

Like all tools, however, strategic attack also has limitations. First and

foremost, it cannot compensate for lack of a strategy. Only in the context of a coherent campaign, one with viable political and military objectives, can strategic attack be effective. Even though precision weapons now "connect political objectives to military execution with much greater reliability than ever before"[35], strategic targeting still supports strategy, it doesn't replace it. As Butch Tilford makes clear in Crosswinds: The Air Force's Setup in Vietnam, our military and political leaders in that unfortunate conflict harbored the illusion that the efficient application of increasing doses of firepower on traditional "strategic" targets could substitute for strategy.[36] The tragic waste of Rolling Thunder was the result. In contrast, Linebacker II was an air campaign supporting a much more limited and achievable political objective--to bring the North Vietnamese back to the peace table. It worked. Strategic attack is not the way to "send the enemy a message" (try Western Union), nor should we ever again consider adopting the discredited "strategy" of gradual escalation. Additionally, using air power to "do something" (as in "We have to do *something* in Bosnia!") is not a substitute for making the hard decisions on just what it is we want done.[37] Strategic air power is a means. Its efficacy is based solely on its application to appropriate ends.

Second, the historical record is pretty clear that strategic attack cannot reliably break enemy will. Populations are resilient under pressure. Those ruled by the totalitarian governments we typically fight are exceedingly so. Strategic bombing is not without its moral impact, but as air power authority Tony Mason concludes in Air Power: A Centennial Appraisal, "After 100 years there is still no incontrovertible evidence that strategic bombardment [alone] has been decisive in breaking the

determination of an opponent to carry on fighting."[38]

Third, strategic attack probably cannot destabilize or decapitate a political regime. Destablizing an enemy regime is not a legitimate military mission, certainly not one achievable by air power alone.[39] Factors which lead to successful coups or popular revolts are extremely complex and highly situation specific. Additionally, while strategic attack can isolate an enemy leader and drive him into his deepest bunker (or farthest suburb), it cannot totally sever him from the populace or his fellow ruling elite. Robert Pape, author of Punishment and Denial, has concluded that Saddam survived our efforts because his regime rested not on his leadership or communications but "on a political structure that air attack could not alter."[40] Furthermore, while specifically targeting an enemy leader with aerial attacks is arguably well within the laws of war[41], in practical terms assassination by air power is a long shot. In most cases, removal of an enemy leader requires, as in the case of Hitler in Germany or Noriega in Panama, the physical occupation of the enemy country While the option to "keep bombing until they throw the body over the wall" theoretically always exists, such extreme means are probably inappropriate for the limited wars we typically fight.

Just as air power cannot guarantee the removal of a political leader, neither can it "absolutely guarantee" complete effectiveness against a particular target set, especially in a short duration effort. Despite our technological advances, the myth of the "surgical strike" remains a myth. Air operations, as discussed earlier, are nonlinear. Unforeseen things happen, particularly in the short run. Additionally, not all types of targets are equally vulnerable. Those that are small and mobile like Scuds, or dispersed, redundant, and well hidden, like the Iraqi nuclear program, are particularly

difficult. The example of the Iraqi nuke program is instructive in this case. At the end of the Gulf War, General Schwarzkopf, his staff, and the intelligence agencies all believed the program had been "put out of business". However, by the summer of 1992 it was apparent to David Kay, who led several of the inspection teams in Iraq, that UN inspectors had "identified and destroyed more of the Iraqi nuclear and missile programs than Coalition intelligence and military power did before the cease fire."[42] While the air campaign made the Iraqis cease work, destroyed elements of some of their known facilities, and helped force them to comply with an extremely intrusive inspection regime, our objectives simply were not achieved through strategic attack alone. In light of this example, we must be correspondingly wary of guaranteeing results, particularly against some of the tougher, non-nodal types of targets.

A further constraint on strategic attack is that it is always, in a sense, a two-edged sword. "Downtown" missions inevitably risk presenting the enemy with a propaganda opportunity such as an errant bomb or a downed aircrew. In "operations-other-than-war", a pilot in enemy hands may leave us with less political leverage than we had before we ever used force, as was the case after operations over Lebanon in 1983. Additionally, despite advances in precision and the corresponding drop in civilian casualties and collateral damage, many people still equate "strategic bombing" with "carpet bombing". As Mason says: "air power will always carry with it the skeletons of Guernica and Dresden....The 'CNN factor' will be exploited to the full by all those who believe that air power is inhumane, somehow unfair and 'yet again' indiscriminate."[43]

Finally, we must realize that air power in general, and strategic attack in

particular, can never completely overcome certain inherent limitations.[44] Perhaps most importantly, the relevance of strategic bombing as an instrument of war is completely dependent upon both the nature of the opponent and the nature of the war. The achievement of strategic effects through the attack of "vital centers" requires that the enemy possess such vital centers in the first place. The industrialized, militarized nation of Iraq in 1991 had such physical "centers of gravity". North Korea in 1950 did not, nor, for the most part, did North Vietnam in 1965. Moreover, in both cases the existence of politically off-limits sanctuaries further limited the effectiveness of strategic attack. The very nature of the conflict itself may additionally make strategic attack inappropriate. Clausewitz cautioned us strictly against trying to turn a particular war into "something that is alien to its nature"[45], which was the heart of our problem in Vietnam. Even today's foremost advocate of strategic attack, Air Force Colonel John Warden, has made it clear that "Air is of marginal value in a fight against self-sustaining guerrillas who merge with the population."[46] Warden further concedes that operations like Urgent Fury (Grenada) and Just Cause (Panama) are best accomplished by ground forces primarily due to the nature of the objectives and the short duration of the conflict.[47]

Additionally, strategic attack--like all other forms of warfare--still remains hostage to the remorseless Clausewitzian concepts of "fog" and "friction". Fog--what we don't know--and friction--the unforeseen and unpredictable consequences of some action--have bedeviled aerial warfare since its inception.[48] In the modern context, the effects of fog may be especially problematic, for precision air warfare requires precision intelligence. In the words of the architect of the Gulf air war, General Buster

Glosson, "A bomb carried halfway around the world and precisely delivered on the wrong target wastes time, resources and perhaps even a human life--not to mention the impotent picture it presents to our adversaries."[49] Furthermore, the cumulative effects of friction impacted even Desert Storm, arguably the most successful air campaign ever Inability to find and suppress the Scuds diverted many sorties and potentially could have sundered the coalition. The unexpectedly "soft" nature of targeted electrical power plants led to far more damage than planned and consequent post-war political fallout. Likewise, the unintentional civilian casualties resulting from the strike on the infamous Al Firdos bunker brought a virtual cessation of attacks on Baghdad during the last two weeks of the war. Unfortunately, at least in the opinion of the authors of the Gulf War Air Power Survey, the roots of these fog and friction difficulties do not appear amenable to technological solutions.[50] Such limitations therefore seem likely to endure.

CONCLUSION

While this paper deliberately sought to make the case for strategic air attack, the limitations discussed above are not trivial. There clearly are significant things a strategic air campaign cannot accomplish or completely overcome. It will not bring "victory through air power" merely by decapitating the enemy leadership or destroying their will to fight. It cannot absolutely guarantee quick effectiveness against a particular target set, and there is always the potential a mistake or misfortune during the course of the effort could present the enemy with political or propaganda leverage. And, despite all the technological advances that have now made air power so

effective, it is nevertheless still hostage (like all forms of force) to fog and friction. Perhaps most importantly, strategic attack is uniquely vulnerable to misapplication in murky strategic situations, and its utility is highly dependent on the nature of both the conflict and the adversary.

On the other hand, such limitations are not compelling reasons for dismissing the potential of strategic attack out of hand, or for relegating air power to the role of something like a massive airborne artillery corps, as some would advocate. On balance, a strategic air campaign still appears to be an important, even vital component of a larger theater campaign. Order of magnitude improvements in efficiency and cost, and a proven ability to quickly achieve certain important effects provides us the means to achieve many theater military or even political objectives. Furthermore, through strategic attack we preclude giving the enemy leadership and population a free ride, cement the effects of an initially successful surprise attack, and reap the benefits of indirect or unforeseen second-order effects.

Strategic attack is not the only way air power can be used effectively, but it is definitely **part** of the way it **should** be used. To win big requires the synergistic effects of air, land, and sea power applied across the length, breadth and depth of the entire theater. Shackling air power strictly to the narrow confines of the battlefield throws away a tremendous strategic advantage only America possesses. While a strategic air campaign will not bring the "quick and easy victory" the theorists seemed to promise, it will bring victory that is quicker and easier than a war waged without one.

NOTES

[1] Carl von Clausewitz, On War, ed. and trans. Peter Paret and Michael Howard (Princeton, NJ: Princeton University Press, 1976) 92-93.

[2] For a review of strategic bombing theory from its beginning to the present, see Giulio Douhet, The Command of the Air (Washington, DC: Office of Air Force History, 1983), David MacIsaac, "Voices from the Central Blue: The Air Power Theorists," Makers of Modern Strategy, ed. Peter Paret (Princeton: Princeton UP, 1986), John A. Warden III, The Air Campaign: Planning for Combat (Washington, DC: National Defense University Press, 1988) and Jason B. Barlow, "Strategic Paralysis: An Air Power Strategy for the Present," Airpower Journal Winter 1993: 4-15.

[3] United States Air Force, Air Force Manual 1-1, Vol. II: Basic Doctrine of the United States Air Force (Washington, DC: GPO, March 1992) 302.

[4] MacIsaac, 621.

[5] Air Force Manual 1-1, 153.

[6] See Les Aspin, Chairman, Committee on Armed Services, U.S. House of Representatives, Defense for a New Era: Lessons of the Persian Gulf War (Washington, DC: GPO, 1992), and Richard P. Hallion, Storm Over Iraq: Air Power and the Gulf War (Washington, DC: Smithsonian Institution Press, 1992)

[7] Brigadier General Robert H. Scales, Jr., Director, Desert Storm Study Project, Certain Victory: The US Army in the Gulf War (Washington, DC: GPO, 1993) 126, 158-212.

[8] Major Stephen T. Ganyard, USMC, "Where Air Power Fails," U.S. Naval Institute Proceedings January 1995: 36-39., Lieutenant Leo S. Mackay, USN, letter on "Voices From the Central Blue," U.S. Naval Institute Proceedings, March 1993: 23-24., and RADM Ned Hogan, USN, "The Ghost of 'Bomber' Harris," U.S. Naval Institute Proceedings December 1994: 13.

[9] Thomas A. Keaney and Eliot A. Cohen, Gulf War Air Power Survey: Summary Report (Air University Reprint) (Washington, DC: GPO, 1993), Michael R. Gordon and General Bernard E.Trainor, The Generals' War (Boston, MA: Little, Brown and Co., 1995), and Robert A. Pape, Jr., "Iraq", from forthcoming book Punishment and Denial (Cornell University Press, est. 1995)

[10] Major Stephen T. Ganyard, USMC, "A Revolution Unrealized: Strategic Air Power in the Gulf War," unpublished manuscript prepared for Marine Corps Gazette, July 1994: 9.

[11] Barry D. Watts, "Army Air Corps & U.S. Air Force Doctrine for Strategic Air Attack: 1926-1991," briefing, Northrup Grumman Analysis Center, December 1994: 28.

[12] Christopher Bowie, et al., The New Calculus: Analyzing Airpower's Changing Role in Joint Theater Campaigns (Santa Monica, CA: RAND, 1993) 48, 62.

[13] Keaney and Cohen, 65.

[14] John A. Warden III, "Employing Air Power in the Twenty-first Century," The Future of Air Power in the Aftermath of the Gulf War, ed. Richard Schulz and Robert Pfaltzgraff (Maxwell, AL: Air University Press, 1992) 76, and Keaney and Cohen, 203.

[15] Office of the Secretary of Defense, Final Report to Congress: Conduct of the Persian Gulf War (Washington, DC: GPO, 1992) 178, and Mark Clodfelter, "Of Demons, Storms and Thunder: A Preliminary Look at Vietnam's Impact on the Persian Gulf Air Campaign," Airpower Journal Winter 1991: 18.

[16] William Arkin, slide, "Civilian Casualties and Damage," in Barry D. Watts and Thomas A. Keaney, Gulf War Air Power Survey, Vol. II, Part II. Effects and Effectiveness (Washington, DC: GPO, 1993) 305.

[17] John G. Heidenrich, "The Gulf War: How Many Iraqis Died?," Foreign Policy Spring 1993: 119.

[18] Albert Speer, Inside the Third Reich (New York: Avon, 1970) 365-366.

[19] Keaney and Cohen, 118. The electricity produced in some parts of Iraq had no bearing on the Iraqi war effort, so it was not targeted.

[20] Keaney and Cohen, 118.

[21] There is still serious debate over whether the communications between Baghdad and the Iraqi army in Kuwait were completely severed or just impeded. See Keaney and Cohen, 68-70.

[22] We should not, however, confuse "effects" with "effectiveness". A strike may achieve its desired effect without necessarily being effective. Conversely, it could fail to achieve its desired effect and yet still be effective. See Watts and Keaney, 25-72.

[23] See Ephraim Kam, Surprise Attack: The Victim's Perspective (Cambridge, MA: Harvard UP, 1988)

[24] Aspin, 7.

[25] Barry D. Watts, "Friction in The Generals' War," unpublished review prepared for Naval War College Review, March 27, 1995: 22.

[26] von Clausewitz, 139.

[27] Watts, "Friction in The Generals' War," 19.

[28] Speer, 363-364.

[29] Williamson Murray, quoted in Watts, "Doctrine for Strategic Air Attack: 1926-1991," 7.

[30] The genesis of this idea came from conversations with both Thomas A. Keaney and Barry D. Watts in February and March, 1995.

[31] Bruce A. Ross, "The Case for Targeting Leadership in War," Naval War College Review Winter 1993: 73.

[32] Conduct of the Persian Gulf War, 74.

[33] Eliot A. Cohen, "The Mystique of U.S. Air Power," Foreign Affairs, January/February 1994: 124.

[34] This calculus will of course need to be adjusted once accurate theater ballistic missiles with unconventional warheads become widely proliferated.

[35] Lt Gen Charles G. Boyd and Lt Col Charles M. Westenhoff, "Air Power Thinking: 'Request Unrestricted Climb'," Airpower Journal Fall 1991: 12.

[36] Earl H. Tilford, Jr., Crosswinds: The Air Force's Setup in Vietnam (College Station, TX: Texas A&M UP, 1993). See also Barry D. Watts review of Crosswinds in Air Power History Winter 1993: 56.

[37] Credit for this concept belongs to Dr. Ilana Kass.

[38] Air Vice Marshal Tony Mason, Air Power: A Centennial Appraisal (London, UK: Brassey's, 1994) 272.

[39] To paraphrase Dr. Ilana Kass.

[40] Pape, 30.

[41] See Ross, "The Case for Targeting Leadership in War", 79-83.

[42] David Kay, quoted in Watts, "Doctrine for Strategic Air Attack: 1926-1991", 15.

[43] Mason, 243.

[44] Although, to be fair, virtually all other forms of force are also subject to these same inherent limitations to some degree.

[45] von Clausewitz, 88.

[46] Warden, The Air Campaign, 147.

[47] Warden, "Employing Air Power in the Twenty-first Century", 62.

[48] See Barry Watts, The Foundations of U.S. Air Doctrine--The Problem of Friction in War (Maxwell, AL: Air University Press, 1984)

[49] Lt Gen Buster C. Glosson, "Impact of Precision Weapons on Air Combat Operations," Airpower Journal Summer 1993: 8.

[50] Watts and Keaney, 370.